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Varieties of Perennial Hay and Pasture Crops for Alberta

Prepared by the Alberta Forage Crops Advisory Committee

Principles of forage crops seeding

- Select areas that will provide the greatest return. Develop the potentially most productive sites first.
- Destroy competing vegetation, especially perennial weeds.
- Seed adapted species of forage crops.
- Seed before the season of maximum rainfall if possible.
- Seed into a firm seedbed such as cereal stubble.
- Seed 0.5 - 1 in. (1-2.5 cm) deep for most forage crops.
- Protect the new seeding until it becomes established.
- Be patient and slow to call a new seeding a failure.

Seeding guide

- Use drill spacings of 18-24 inches (45-60 cm) in Area 1; 18 inches (45 cm) in the drier parts and 12 inches (30 cm) in the moister parts of Area 2. Use 6-to 8-inch (15-20 cm) drill spacings in Areas 3 and 4 and under irrigation.
- Set the drill to seed about 20-25 seeds/foot (65-80 seeds/m) of row for 6-to 8-inch (15-20 cm) drill spacings, or 25-30 seeds/foot (80-100 seeds/m) of row for 12- to 24-inch (30-60 cm) drill spacings. Higher rates of seeding are used under irrigation and for small seeded crops.
- Seed grasses and legumes in alternate rows or cross-seed for maximum production in dry areas.
- A companion crop, if used, should be cross-seeded at half its normal seeding rate and fertilizer should be applied to provide a maximum of 30-40 lb/ac (kg/ha) of total available soil nitrogen to reduce competition.
- Control weeds in first year stands by pre-or post emergent chemical treatment, mowing, or by early silage making.
- Use Certified No. 1 seed of recommended varieties to reduce risk of introducing a poorly adapted variety or noxious weeds. Details of seed quality are available by request from seed dealers.
- For optimum nitrogen fixation in legumes inoculate seed just prior to seeding with appropriate viable *Rhizobium* inoculant using a sticking agent or use recently pre-inoculated seed. Store inoculated seed out of direct sunlight and in a cool location.

Tear out and retain for future reference

Seeding Rates for Pure Forage Stands

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Legumes	Approx. No. of seeds seeds/lb	seeds/kg	Approx. Seeding Rate in lb/ac (or kg/ha) for various row spacings 6 in. (15 cm)	12 in. (30 cm)	24 in. (60 cm)	36 in. (90 cm)
Alfalfa	200,000	(440,000)	8	5	3	
Alsike clover	700,000	(1,540,000)	5			
Red clover	275,000	(605,000)	6			
White clover	800,000	(1,760,000)	5			
Cicer milk-vetch	130,000	(286,000)	13	8	5	
Sainfoin (pods on)	23,000	(50,000)	30	20	12	
Sweet-clover	260,000	(572,000)	9	6		
Bird's-foot trefoil	375,000	(825,000)	6			
Grasses						
Kentucky bluegrass	2,180,000	(4,800,000)	6	4		
Meadow bromegrass	80,000	(176,000)	12	7		
Smooth bromegrass	136,000	(300,000)	8	5		
Reed canary grass	535,000	(1,175,000)	6	4		
Creeping red fescue	615,000	(1,353,000)	5	3		
Meadow fescue	230,000	(506,000)	8	5		
Tall fescue	225,000	(500,000)	8	5		
Creeping foxtail	750,000	(1,657,000)	5			
Meadow foxtail	575,000	(1,270,000)	5			
Orchard grass	650,000	(1,439,000)	6	4		
Timothy	1,230,000	(2,710,000)	5			
Crested wheatgrass	175,000	(385,000)	7	5	3	
Intermediate wheatgrass	88,000	(194,000)	10	6		
Northern wheatgrass	155,000	(340,000)	7	5	3	
Pubescent wheatgrass	100,000	(220,000)	10	6		
Slender wheatgrass	160,000	(350,000)	8	5		
Streambank wheatgrass	155,000	(344,000)	8	5		
Tall wheatgrass	79,000	(174,000)	12	9		
Western wheatgrass	110,000	(242,000)	10	6	4	
Altai wild rye	55,000	(121,000)		12	8	4
Russian wild rye	175,000	(385,000)		5	3	2

Adapted Crops and Mixtures Commonly Used in Alberta

	Area and Row Spacing	Crops	Approx. seeding rate[1] (lb/ac or kg/ha) Hay	Pasture
1.	**BROWN SOIL ZONE[2]**			
	24-36 in. (60-90 cm)	Altai wild rye + alfalfa	—	4+1 to 2*
	18-24 in. (45-60 cm)	Russian wild rye + alfalfa	—	3+1 to 2*
	18-24 in. (45-60 cm)	Crested wheatgrass + alfalfa	4+2	4+1 to 2*
	18-24 in. (45-60 cm)	Alfalfa	4	—
	12-18 in. (30-45 cm)	Smooth bromegrass + alfalfa (moister parts)	7+2	7+1 to 2*
	12-18 in. (30-45 cm)	Pubescent or intermediate wheatgrass + alfalfa (moister parts)	8+2	8+1 to 2*
2.	**DARK BROWN SOIL ZONE[2,3]**			
	18-24 in. (45-60 cm)	Altai wild rye + alfalfa	—	6+1 to 2*
	12-18 in. (30-45 cm)	Russian wild rye + alfalfa	—	5+1 to 2*
	12-18 in. (30-45 cm)	Crested wheatgrass + alfalfa	5+2	5+1 to 2*
	12-18 in. (30-45 cm)	Smooth bromegrass + alfalfa	7+2	7+1 to 2*
	12-18 in. (30-45 cm)	Pubescent or intermediate wheatgrass + alfalfa	8+2	8+1 to 2*
	12-18 in. (30-45 cm)	Alfalfa	5	—
	6-12 in. (15-30 cm)	Sweet-clover	8	—

	Area and Row Spacing	Crops	Approx. seeding rate[1] (lb/ac or kg/ha) Hay	Pasture
3.	**BLACK SOIL ZONE[2]**			
	6-8 in. (15-20 cm)	Smooth bromegrass + alfalfa	6+5	8+1 to 3*
	6-8 in. (15-20 cm)	Crested wheatgrass + alfalfa	5+4	7+1 to 3*
	6-8 in. (15-20 cm)	Intermediate wheatgrass + alfalfa	7+5	9+1 to 3*
	6-8 in. (15-20 cm)	Meadow bromegrass + alfalfa	—	10+1 to 3*
	6-8 in. (15-20 cm)	Creeping red fescue + smooth bromegrass + alfalfa	—	2+6+2 to 3*
	6-8 in. (15-20 cm)	Orchard grass + alfalfa	—	6+1 to 3*
	6-8 in. (15-20 cm)	Timothy + smooth bromegrass + alfalfa (moister parts)	2+6+5	2+7+2 to 3*
	6-8 in. (15-20 cm)	Meadow or creeping foxtail + alsike clover (moist and flooded sites)	4+4	5+2
	6-8 in. (15-20 cm)	Alfalfa	8	—
	6-8 in. (15-20 cm)	Sweet-clover	9	—
	6-8 in. (15-20 cm)	Bird's-foot trefoil (moister parts)	6	6
	6-8 in. (15-20 cm)	Meadow or creeping foxtail (moist and flooded areas)	5	5
4.	**GRAY LUVISOL SOIL ZONE[4]**			
	6-8 in. (15-20 cm)	Smooth bromegrass + alfalfa	6+5	8+1 to 3*
	6-8 in. (15-20 cm)	Meadow bromegrass + alfalfa	—	10+1 to 3*
	6-8 in. (15-20 cm)	Intermediate wheatgrass + alfalfa	7+5	9+1 to 3*
	6-8 in. (15-20 cm)	Creeping red fescue + smooth bromegrass + alfalfa	—	2+6+2 to 3*
	6-8 in. (15-20 cm)	Creeping red fescue + intermediate wheatgrass + alfalfa	—	2+6+2 to 3*
	6-8 in. (15-20 cm)	Creeping red fescue + timothy + alsike clover (moist and flooded sites)	3+3+2	3+2+2
	6-8 in. (15-20 cm)	Reed canary grass + alsike clover (moist and flooded sites)	4+4	6+2
	6-8 in. (15-20 cm)	Timothy + alfalfa + red clover	4+2+3	—
	6-8 in. (15-20 cm)	Timothy + alsike clover	4+4	—
	6-8 in. (15-20 cm)	Meadow or creeping foxtail + alsike clover (moist and flooded sites)	4+4	5+2
	6-8 in. (15-20 cm)	Alfalfa	8	—
	6-8 in. (15-20 cm)	Sweet-clover	9	—
	6-8 in. (15-20 cm)	Bird's-foot trefoil	6	6
	6-8 in. (15-20 cm)	Meadow or creeping foxtail (moist and flooded sites)	5	5
5.	**IRRIGATION**			
	6-8 in. (15-20 cm)	Alfalfa	10	—
	6-8 in. (15-20 cm)	Sainfoin	35	35
	6-8 in. (15-20 cm)	Orchard grass + meadow bromegrass + white clover	—	6+8+2
	6-8 in. (15-20 cm)	Orchard grass + alfalfa	4+8	8+2 to 3*
	6-8 in. (15-20 cm)	Smooth or meadow bromegrass + alfalfa	8+5	10+2 to 3*
	6-8 in. (15-20 cm)	Intermediate or pubescent wheatgrass + alfalfa	12+5	12+2 to 3*
	6-8 in. (15-20 cm)	Kentucky bluegrass + alfalfa	—	10+2 to 3*

[1] Increase seeding rate by about one-half if broadcasting the seed and harrowing it into soil.

[2] Cicer milk-vetch at 5-6 lb/ac (or kg/ha) can be substituted for alfalfa in the pasture mixtures.

[3] Sainfoin at 10-15 lb/ac (or kg/ha) can be substituted for alfalfa in the pasture mixtures.

[4] Mixtures containing sweet-clover are useful on poorly structured Gray Luvisol soils where crusting and compaction occur.

* HIGHER SEEDING RATE OF ALFALFA COMPONENT IS ADVANTAGEOUS FOR YIELD AND QUALITY BUT MAY REQUIRE THE USE OF BETTER BLOAT CONTROL MEASURES.

Yield Comparison of Alfalfa Varieties

DRY MATTER YIELD AS % OF BEAVER, WITH NUMBER OF TEST YEARS IN BRACKETS

		Area 1	Area 2		Area 3		Area 4	
VARIETY	TYPE	Brooks[1]	Leth.[1]	Standard	Lacombe	Edmonton	Beaverlodge	Ft.Vermilion
Admiral	Fl.	—[2]	105 (11)	—	88 (3)	89 (3)	85 (4)	—
Algonquin	Std.	100 (6)	104 (3)	110 (9)	102 (12)	102 (4)	98 (11)	—
Anchor	Fl.	97 (5)	105 (29)	99 (6)	103 (15)	108 (10)	93 (14)	105 (6)
Angus	Fl.	101 (5)	101 (3)	97 (6)	104 (10)	100 (4)	93 (8)	—
Anik	Sib.	—	76 (3)	—	—	—	97 (11)	—
Apica	Fl.	—	106 (11)	—	110 (5)	107 (6)	90 (7)	103 (6)
Award	Fl.	—	103 (7)	—	103 (3)	98 (3)	—	—
Barrier	Std.	—	111 (10)	—	—	—	—	—
Beaver	Std.	100 (6)	100 (29)	100 (9)	100 (15)	100 (10)	100 (18)	100 (6)
Citation	Fl.	107 (6)	—	101 (6)	103 (5)	—	—	—
Dekalb 120	Std.	—	107 (4)	—	—	112 (3)	89 (3)	100 (4)
Drylander	Dry.	97 (5)	—	121 (6)	92 (5)	—	—	—
Heinrichs	Dry.	95 (3)	102 (3)	103 (5)	102 (7)	83 (4)	100 (8)	—
Pacer	Fl.	105 (5)	109 (11)	100 (6)	102 (7)	103 (3)	84 (6)	96 (4)
Peace	Std.	93 (5)	—	95 (6)	98 (5)	—	103 (11)	—
Pioneer 524	Std.	101 (3)	107 (8)	109 (5)	—	93 (3)	93 (3)	91 (4)
Pioneer 532	Fl.	—	102 (8)	—	—	107 (3)	94 (3)	100 (4)
Primal	Fl.	100 (3)	110 (6)	92 (5)	—	—	—	—
Rambler	Dry.	92 (6)	93 (21)	106 (9)	95 (15)	83 (10)	103 (18)	117 (6)
Rangelander	Dry.	93 (5)	100 (3)	104 (6)	95 (10)	79 (4)	103 (8)	—
Roamer	Dry.	100 (5)	—	107 (6)	96 (5)	—	—	—
Spredor 2	Dry.	—	96 (8)	—	—	94 (3)	102 (6)	140 (4)
Thor	Fl.	99 (6)	98 (11)	104 (9)	101 (10)	98 (7)	90 (11)	92 (4)
Titan	Std.	101 (5)	—	103 (6)	99 (5)	—	—	—
Trek	Std.	98 (5)	100 (11)	90 (6)	94 (10)	92 (7)	91 (7)	99 (4)
Trumpetor	Fl.	—	104 (15)	—	103 (5)	88 (3)	86 (7)	—
Vernal	Std.	98 (5)	103 (25)	100 (6)	101 (15)	100 (10)	98 (18)	110 (6)
Vista	Fl.	102 (3)	103 (4)	99 (5)	103 (7)	93 (3)	83 (5)	—
YIELD OF BEAVER[2]								
— lb/ac		12,000	8,995	2,581	8,520	6,860	2,700	4,060
— kg/ha		13,440	10,075	2,891	9,545	7,685	3,025	4,550
No. of test years		6	29	9	15	10	18	6

[1] Irrigation

[2] Insufficient data (less than 3 test years) or not tested

Std. = standard type; Fl. = Flemish - better regrowth but less hardy; Sib. = Siberian type; Dry. = dryland type

Adaptability and Characteristics of Alfalfa Varieties

Variety	Areas Recommended	Hardiness Rating	Recovery after Cutting[1]	Resistance to Bacterial Wilt[2]	Other Features
Admiral	Irr.	Fair[3]	Rapid	Resistant	Moderate resistance to Verticillum Wilt
Algonquin	3,4,Irr.	Good	Medium	Resistant	
Anchor	2,3,4,Irr.	Fair	Rapid	Resistant	
Angus	3,Irr.	Fair	Rapid	Resistant	
Anik	4	Excellent	Very Slow	Susceptible	Yellow flowered, persistent in N. areas.
Apica	3,Irr.	Fair[3]	Rapid	Moderately resistant	
Award	3,Irr.	Fair[3]	Rapid	Resistant	
Barrier	Irr.	Good[3]	Medium	Resistant	Good resistance to Verticillum Wilt
Beaver	2,3,4,Irr.	Good	Medium	Resistant	Standard variety for comparison.
Citation	3,Irr.	Fair	Rapid	Resistant	
Dekalb 120	3,Irr.	Good	Medium	Resistant	
Drylander	1,2,3*	Excellent	Slow	Resistant	Strongly creeping, well suited for dryland pasture.
Heinrichs	1,2,3,4	Excellent	Slow to Medium	Resistant	Moderately creeping, well suited for dryland hay.

Variety	Areas Recommended	Hardiness Rating	Recovery after Cutting[1]	Resistance to Bacterial Wilt[2]	Other Features
Pacer	2,3,4,Irr.	Fair	Rapid	Resistant	
Peace	3,4	Excellent	Medium	Susceptible	Persistent in N. Alberta. Grimm type.
Pioneer 524	2,Irr.	Good[3]	Medium	Moderately resistant	
Pioneer 532	3,Irr.	Fair[3]	Rapid	Resistant	
Primal	Irr.	Fair	Rapid	Moderately resistant	Tolerant to the pea aphid.
Rambler	1,2,3*,4	Excellent	Slow	Moderately resistant	Creeping standard dryland type.
Rangelander	1,2,3*,4	Excellent[3]	Slow	Susceptible	Strongly creeping, persistent in dryland pasture.
Roamer	1,2,3*,Irr.	Excellent[3]	Slow	Resistant	Creeping type.
Spredor 2	3,4	Excellent[3]	Slow	Resistant	Strongly creeping, suitable for dryland hay or pasture.
Thor	2,3,4,Irr.	Fair	Rapid	Resistant	
Titan	2,3,Irr.	Good[3]	Medium	Resistant	
Trek	Irr.	Good	Medium	Resistant	Resistant to stem nematodes.
Trumpetor	3,Irr.	Fair[3]	Rapid	Moderately resistant	Moderate resistance to Verticillium wilt.
Vernal	2,3,4,Irr.	Fair	Medium	Resistant	
Vista	3,Irr.	Fair[3]	Rapid	Moderately resistant	

[1] Recovery after cutting is rated very slow; slow; slow to medium; medium; or rapid.
[2] Resistance to bacterial wilt is important mainly in irrigated areas.
[3] Hardiness has insufficient testing for an accurate rating in Northern Alberta.
* Indicates the variety is being considered for removal from the recommended list for the area indicated.

Recommended legumes for Alberta

*Note: ** Beside the variety name indicates it is the standard variety.*

Alfalfa

A medium lived perennial with deep roots and good drought tolerance. It is adapted to a wide range of soils but does best on deep loam soils with a high lime content. It tolerates some alkalinity and salinity, but is intolerant of acid soil (below pH 6.0), poor internal soil drainage, water logging or flooding (except for short periods in spring). Harvesting in August in northern and central Alberta, or harvesting in September in southern Alberta using three-cut systems, will predispose alfalfa to winterkill. Other factors affecting winter survival include choice of variety, age of the stand, weather conditions, and other factors related to the vigor of the stand.

Four types of alfalfa varieties are recommended in Alberta. Flemish types are early maturing, high yielding but less hardy than other types. Siberian alfalfa has small leaves, yellow blossoms, lower yield, but is most hardy. Varieties identified as standard types have some Siberian parentage to give adequate hardiness for general use and some common or Flemish parentage to provide a good yield. Dryland types also have both Siberian and Flemish or common parentage, but have been developed for better persistence in dryland environments.

Alfalfa is the preferred hay crop in Alberta since it produces a higher yield and higher quality fodder compared to other forages. It is also the most used legume for pasture since it has good yield and fair persistence under grazing. Bloat hazard is similar to that for clovers.

Alsike clover

A short-lived perennial with fairly deep roots. It is adapted to cool moist areas and will tolerate waterlogged soils and considerable spring flooding so that it is the most flood tolerant legume recommended in Alberta. This legume is tolerant of acidity and alkalinity but not to drought or salinity. Canadian varieties can be diploid or tetraploid. The tetraploids are taller, have larger leaves and flowers, and are later maturing. Alsike clover is useful for hay production, although only one cutting is produced. Its high moisture content makes hay drying more difficult. Regrowth after hay harvesting is excellent for fall grazing. Alsike clover is useful for pasture although lack of longevity limits its value to the first few years of production. Bloat hazard is similar to that of red clover and alfalfa. Cirrhosis of the liver of horses has been associated with alsike clover consumption. Recommended in Areas 3 and 4.

Aurora** - Diploid, hardy, good yield.

Dawn - Diploid, slightly superior to Aurora in yield, regrowth and hardiness.

Tetra - Tetraploid, less hardy than Aurora, good to very good yield.

Red clover

A hardy, but short-lived perennial legume with fairly deep roots. It is intolerant of waterlogged soil or flooding except for short periods in spring. Red clover is slightly more acid tolerant than alsike clover making it the most acid tolerant legume recommended in Alberta. It is intolerant of salinity and drought. Red clover is high yielding for hay although high moisture content makes it difficult to dry. Good moisture and early cutting regrowth after hay harvesting makes it excellent for fall pasture. It is useful for pasture although not persistent under grazing. Bloat hazard is similar to that for alsike clover and alfalfa. Recommended in Areas 3 and 4.

Altaswede** - Single cut type, hardy, high yielding.

Florex - Double cut type, compared to Altaswede it is more resistant to powdery mildew, less hardy and shorter lived.
Norlac - Similar to Altaswede but is slightly earlier blossoming, slightly shorter and yields slightly less forage. It is resistant to northern anthracnose.

White clover

A moderately hardy legume which is short-to long-lived. It has a shallow tap root system. Individual plants spread by above-ground creeping stems which set down new roots. White clover does best on well drained soils that have a fairly constant supply of moisture. It can be grown on sandy soils if moisture is plentiful. This legume is intolerant of saline or alkaline soils or drought. It does poorly on waterlogged soil and is intolerant of prolonged flooding. It tolerates slight acidity. As pasture, white clover is more persistent than other common clovers. The ladino type (taller growing) is recommended for irrigation.

Cicer milk-vetch

A long-lived, hardy, bloat free perennial legume with deep roots and a creeping growth habit. It tolerates soils with a high water table but not flooded conditions. This legume tolerates drought and alkalinity well and has some tolerance for acidity and salinity. It has a high percentage of hard seeds and slow growing seedlings so that two years are often needed for establishment. It can be used for hay, but it yields best in a pasture mixture. This legume tolerates grazing well, and grows well throughout the growing season. Unlike some native milk-vetches this species does not accumulate selenium. Recommended in Areas 2, 3, and 4.
Oxley - Hardy, vigorously creeping, the only variety licensed in Canada.

Sainfoin

A potentially long-lived, bloat-free perennial legume with deep roots. It is very drought tolerant, exceeding alfalfa in this characteristic, but is less winter hardy. This legume does well on highly alkaline soils. Sainfoin does best on soils where alfalfa grows well. It requires good drainage and is intolerant of flooding or high water tables. Sainfoin is best suited to hay production under single cut harvesting systems as it does not regrow well. It competes poorly in mixtures especially those with creeping-rooted grasses. For pasture use it provides very early, highly palatable growth. It does not regrow well, especially if grazed closely. Recommended in Area 2 and Irrigation.
Melrose** - The first variety licensed in Canada.
Nova - Compared to Melrose, it has slightly more hardiness and yields better.

Sweet-clover

A hardy, drought tolerant biennial legume with deep roots. It grows on a wide range of soils but prefers clay and clay loams. This legume requires well drained soils that do not flood or become waterlogged, except for very short periods in spring. Sweet-clover is tolerant of alkalinity and some salinity but not acidity. It is frequently damaged by sweet-clover weevils. Yellow types are more drought tolerant, more vigorous as seedlings, finer stemmed, shorter and earlier maturing, than white types. Sweet-clover is high yielding for hay, but should be cut in the bud stage for good quality. Use of low coumarin varieties reduces risk of livestock losses from internal bleeding due to coumarin. Sweet-clover, especially the white type, produces well for pasture. It is ready for grazing early and will regrow well if a height of about one foot is maintained. Bloat is a potential problem. Recommended in Areas 1, 2, 3, and 4.
Norgold - A yellow flowered, low coumarin variety. It yields slightly less than Yukon but more than Polara.
Polara - A white flowered, low coumarin variety.
Yukon** - A yellow flowered, high coumarin variety with very good seedling vigor and high yield.

Bird's-foot trefoil

A potentially long-lived, bloat free perennial legume with deep roots. It tolerates waterlogged soils, some flooding and acidity, but not as much as alsike clover. It is tolerant of alkalinity and some salinity. Bird's-foot trefoil is not competitive and stand establishment and persistence have been problems. It is useful for hay, although yields are generally lower than for alfalfa. This legume is fairly tolerant of grazing, is palatable, and has fair regrowth. It should be grown in pure stands or with non creeping-rooted grasses. Weed control, especially during the establishment year, is important. Recommended in Areas 3 and 4.
Cree - Similar to Leo but slightly more hardy.
Leo** - Fairly hardy, semi-erect, a fine stemmed and late maturing type.

Recommended grasses for Alberta

Kentucky bluegrass

Long-lived perennial with shallow creeping roots. It is adapted to a wide range of soils but requires good drainage and more moisture than is generally available in prairie regions. Although slow to get established, it is aggressive when established, and best used for pasture. Recommended in Area 3, 4, and Irrigation.
Troy - Tall erect growth and creeps less aggressively than turf types. Regrowth ability is good.

Meadow bromegrass

Similar to smooth bromegrass in adaptation to soils and climatic conditions but slightly less hardy. Compared to smooth bromegrass it creeps more slowly, is more difficult to establish, yields less for hay, but has much better regrowth for fall grazing. In pasture stands it has a much improved seasonal distribution of growth, remains more vegetative and is more palatable. It does not tolerate flooding. Recommended in Areas 2, 3, 4, and Irrigation.
Regar - Only variety recommended for Alberta.

Smooth bromegrass

A long-lived, winter hardy, deep rooted perennial which spreads by creeping roots. It is adapted to a wide range of soil conditions and tolerates extreme temperatures, some alkalinity, salinity and acidity. This grass is fairly drought tolerant but less so than intermediate, pubescent and slender wheatgrass. It is intolerant of flooding (other than up to two weeks in spring) and waterlogged soil.

Smooth bromegrass is the most used tame grass in Alberta. Northern varieties are more hardy, more leafy and less vigorously creeping than southern varieties. The southern types are easier to establish, taller and higher yielding, earlier growing in spring and produce forage longer in fall (but much less so than meadow bromegrass).

Smooth bromegrass produces excellent hay yields although regrowth after hay cutting is poor. For pasture it is early growing, palatable, gives a high total yield, but has poor regrowth in summer and fall.
Baylor - A southern type, does well under irrigation with good yield and fair regrowth. Recommended in Areas 2, 3, and Irrigation.
Carlton** - A northern type, especially well suited for north and north central Alberta with good yield and slow regrowth. Recommended in Areas 2, 3, 4, and Irrigation.
Magna - An intermediate northern-southern type. Similar to Carlton in hardiness, yield and regrowth ability. Recom-

mended in Areas 2, 3, 4, and Irrigation.
Manchar - An intermediate northern-southern type with good yield and hardiness. Ability to regrow is slightly better than Carlton's. Recommended in Areas 2, 3, 4, and Irrigation.

Reed canary grass

A tall, coarse, long-lived perennial with deep roots and short rhizomes. It is tolerant of up to two months of ponding and does well on waterlogged soils. This grass withstands some acidity, alkalinity and drought, but does not tolerate salinity. Reed canary grass is very high yielding for hay. Crude protein content is similar to other grasses if harvested at the same stage of maturity. It is suitable for pasture, although its low palatability requires that it be fenced separately to control grazing. Spring growth is early and regrowth following grazing is good. Recommended in Areas 2, 3, and 4. Not recommended for irrigation since it persists in canals and restricts waterflow.
Castor** - Well suited to peat soils and heavy soils where moisture is adequate.
Vantage - Early maturing and has a decreased level of the alkaloid tryptamine (one of the alkaloids associated with low palatability).

Creeping red fescue

A winter hardy, long-lived perennial with fibrous roots and a strong creeping growth habit. It is most adapted to higher rainfall areas and tolerates some spring flooding and waterlogged soils. This grass is best used for pasture; growth is well distributed throughout the season. Nutritive value is adequate for late fall grazing. Recommended in Areas 3 and 4.
Boreal** - Selected for improved seedling vigor and winter hardiness.
Reptans - Similar to Boreal in forage yield and winter hardiness, and is a satisfactory alternate to Boreal.

Meadow fescue

A short-lived perennial grass with fair winter hardiness. Its roots do not creep. This grass does best on heavy moist soils and on irrigated land. Since most growth is from basal leaves it is best suited to pasture production. It is less palatable than most grasses. Distribution of growth is fairly good, although regrowth is not rapid. Recommended in Areas 2, 3 and Irrigation.
Trader - A leafy late maturing variety with good regrowth. Compared to earlier varieties, this selection has an improved forage yield.

Tall fescue

A long-lived perennial grass with fair winter hardiness. It has deep roots but does not creep. This grass grows on wet soils, tolerates alkalinity, acidity and salinity and is fairly drought tolerant. Tall fescue gets established slowly. Since it has mainly basal leaves it is best used for pasture where it is palatable and yields well over the season. It can be used for for hay. Recommended in Areas 1, 2, and Irrigation.
Alta - The only variety hardy enough for use in Alberta.

Meadow foxtail

A long-lived, hardy perennial with slowly creeping roots. It compares favorably to reed canary grass in tolerance to pond ing and prefers soils with high water tables and cool conditions, including peaty soils. It also does well on loam or clay loam soils in areas of high rainfall. This grass tolerates high alkalinity, acidity, and some salinity when established. Meadow foxtail has a low tolerance for drought. It generally yields less than timothy for hay, and lodging is a problem. Regrowth following hay cutting is very good. Meadow foxtail is especially suited to pasture production and produces very early spring growth and good regrowth.

Creeping foxtail, a different species, has very vigorously creeping rhizomes which spread rapidly. It is adapted to similar areas as meadow foxtail, although its creeping roots make it useful on sandy sites which have good moisture, and for erosion control along waterways. Compared to meadow foxtail it is taller growing and more coarse. The dense vigorous creeping roots make it difficult to control by cultivation.

Meadow and creeping foxtail are recommended for use in flooded and moist sites in Areas 3 and 4. There are no recommended varieties for Alberta.

Orchard grass

A medium-lived perennial bunchgrass with a dense deep root system. It tolerates some acidity, some drought and is very shade tolerant. As a pasture grass, it yields well, regrows well and is highly palatable. It does not tolerate continued close grazing. Orchard grass is satisfactory for hay, and although it is not as high yielding as the more commonly used hay species, there is very good regrowth after cutting. Being a bunchgrass it allows good growth of legumes and its regrowth after hay cutting makes it excellent for fall grazing.
Chinook - More hardy than other varieties except Kay. It has early growth and matures early. Recommended for irrigation.
Kay** - The most hardy variety. It withstands cool wet weather well. It is recommended for irrigation as well as in preferred sites in Areas 3 and 4.

Timothy

A perennial bunchgrass which is winter hardy and persistent in the cooler, moister areas of Alberta. It has shallow roots and is intolerant of drought. This grass is very acid tolerant, does well on waterlogged and peat soil as well as on clay, silt and sandy soil provided moisture is adequate. It withstands spring flooding but is intolerant of salt and alkalinity. Timothy is high yielding for hay production and being a bunchgrass it does not crowd legumes out of a mixture as quickly as more competitive species such as smooth bromegrass. It is palatable and high yielding for pasture but is not especially early growing in spring with only fair to good regrowth, depending on variety.
Basho - Developed from one of the 10 clones that were used to produce Champ. It is taller growing and has longer seed heads than Champ. Ability to regrow is intermediate between Climax and Champ. Recommended in Area 3 and for Irrigation.
Bottnia II - A medium maturity variety with good yielding ability. Recommended in Area 4.
Bounty - Compared to Climax this variety is later maturing, taller, and has broader leaves. It has poor regrowth ability. Recommended in Areas 3, 4, and Irrigation.
Champ - Compared to Climax this variety is earlier growing and has shorter stems and heads. It has more basal leaves and improved regrowth ability making it more useful for pasture. Recommended in Areas 3, 4, and for Irrigation.
Climax** - A tall, broad-leaved, medium maturity hay variety with poor regrowth ability. Recommended in Areas 3, 4, and Irrigation.
Itasca - A leafy, medium maturity type variety with poor regrowth. Recommended in Areas 3 and 4.
Richmond - An early maturing variety with improved regrowth making it useful for fall grazing. Recommended in Area 3 and Irrigation.
Tiiti - A medium maturity variety with good yielding ability. Recommended in Area 4.
Timfor - A medium maturing variety. It is recommended in Areas 3 and 4.
Toro - An early maturing variety with short leaves. Regrowth is improved making it useful for fall grazing. Recommended in

Areas 3 and 4.

Crested wheatgrass

A very winter hardy and extremely drought tolerant, long-lived perennial with extensive deep fibrous roots. It is easy to establish and is especially adapted to sandy soils. This grass is intolerant of high water tables and withstands only short periods of spring flooding. Crested wheatgrass is very productive as dryland hay and its bunch growth habit gives less competition to legumes in mixtures. It tolerates grazing well and provides very early palatable pasture with some regrowth.

Diploid varieties have smaller seeds, finer stems and leaves, and are more tolerant of moisture. Tetraploids remain greener during severe drought.

Fairway - Diploid, most useful for pasture. Recommended in Areas 1, 2, 3, and 4.

Nordan** - Tetraploid, excellent seedling vigor and yield. Recommended in Areas 1 and 2.

Parkway** - Diploid, taller growing and, therefore, more useful for hay than Fairway. Recommended in Areas 1, 2, 3, and 4.

Summit - Tetraploid, similar to Nordan in growth habit and yield. Recommended in Areas 1 and 2.

Intermediate wheatgrass

High yielding perennial with deep feeding creeping roots. It is easily established and generally adapted to places where bromegrass does well, but is somewhat shorter lived. It is more drought tolerant than bromegrass but less than crested wheatgrass; produces well for hay and pasture. Most pasture is produced in spring and early summer, but regrowth is better than for smooth bromegrass. Recommended in Areas 2, 3, 4 and Irrigation.

Chief - This variety was selected for its good yield, winter hardiness and drought tolerance.

Clarke** - Similar to Chief but has improved hardiness and drought tolerance.

Northern wheatgrass

A long-lived and widely distributed native perennial. It is commonly found throughout Area 2, the more moist parts of Area 1 and the drier parts of Area 3. This grass has dense shallow roots, some deep roots and creeping roots giving it good drought tolerance. It is easy to establish and is adapted to a wide range of soils including areas subject to wind and water erosion. It does best on medium and coarse textured soils and withstands some alkalinity. It is especially useful for reclamation and can be used for hay and pasture production. Recommended in Areas 1, 2, and 3.

Elbee - The only variety licensed in Canada. It was developed from native selections.

Pubescent wheatgrass

A medium to long-lived perennial grass with creeping roots. It is similar to intermediate wheatgrass, but is longer-lived, more drought tolerant, and has improved seedling vigor and winter hardiness. This grass is considerably more drought tolerant than smooth bromegrass, but less so than crested wheatgrass. It is high yielding for both hay and pasture. Spring growth is early and very palatable. Recommended in the more moist parts of Area 1 and in Areas 2, 3, 4, and Irrigation.

Greenleaf - The only variety licensed in Canada.

Slender wheatgrass

A short-lived and widely distributed native bunchgrass. It is very drought tolerant but less so than crested wheatgrass. Slender wheatgrass prefers sandy loam soils, but is more persistent than crested wheatgrass or smooth bromegrass on heavy textured soils. It is very tolerant of alkalinity but does not tolerate waterlogged soil. This grass is easily established and is very productive for 3 to 4 years for hay or pasture. Recommended for use throughout Alberta.

Revenue - The only variety licensed in Canada. It was developed from native selections.

Tall wheatgrass

A tall, coarse, late maturing bunch grass. It lacks drought tolerance and is slow to become established. It is the most saline tolerant of the tame forage species in Alberta and does well on subirrigated land. This grass is tolerant of alkalinity. Tall wheatgrass is satisfactory for hay and pasture, although it has low palatability. Recommended in Areas 2, 3, 4 and Irrigation.

Orbit - Selected for winter hardiness, it is the only variety licensed in Canada.

Western wheatgrass

A very hardy, long-lived native grass. It is closely related to northern wheatgrass but is not quite as drought tolerant. It has dense shallow roots, deep feeding roots as well as creeping roots. It is adapted to a wide range of soils but prefers heavy and somewhat alkaline soils which receive spring run-off or flooding. This grass is especially useful for reclamation and can also be used for hay and pasture production. Recommended in Areas 1, 2, and 3.

Walsh - The only variety licensed in Canada. It was developed from native selections.

Altai wild rye

A winter hardy, drought tolerant, long-lived perennial with very deep roots and a creeping growth habit. It is well adapted to medium and heavy soils and is very tolerant of salinity. Seedlings are poor competitors and require two seasons to get established. This grass is best suited for pasture. Growth begins early in spring and continues into late fall. Nutritive value is adequate for late fall grazing. Recommended in Areas 1 and 2.

Prairieland - The only variety licensed in Canada.

Russian wild rye

A very winter hardy and drought tolerant perennial with deep roots and a bunch growth habit. It does best on medium textured and heavy soils although it does well on sandy soils once it is established. This grass has a high tolerance for salinity and is fairly tolerant of alkalinity. It is intolerant of flooding. Russian wild rye is difficult to establish and should be allowed to set seed once to be sure the stand is mature enough to be grazed. It has a good distribution of growth, although it is best to use it to extend the grazing season in the fall or early winter. Russian wild rye is not suitable for hay production since most of its growth is from basal leaves. Recommended in Areas 1 and 2.

Cabree** - Better seedling vigor and yield than Mayak.

Mayak - Good yield and leafiness.

Swift - Developed for improved establishment by selecting for the ability to emerge from deep seeding (5 cm or 2 inches). It yields slightly less than Cabree.

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